Amendment to the Claims:

1. (Previously presented) A gradient coil for a magnetic resonance imaging apparatus, the gradient coil including:

a fingerprint-patterned primary coil defining an inner cylindrical surface;

a shield coil defining an outer cylindrical surface coaxially aligned with the inner cylindrical surface and having a larger cylindrical radius than the inner cylindrical surface; and

a plurality of coil jumps electrically connecting the primary and shield coils, the coil jumps defining a non-planar current-sharing surface extending between an inner contour coinciding with the inner cylindrical surface and an outer contour coinciding with the outer cylindrical surface;

the primary coil, shield coil, and coil jumps cooperatively defining a current path that passes across the current-sharing surface between the inner and outer contours a plurality of times.

2. (Previously presented) The gradient coil as set forth in claim 1, wherein:

the primary coil extends axially a primary coil length along the inner cylindrical surface; and

the shield coil extends axially a shield coil length along the outer cylindrical surface;

the shield coil length not equal to the primary coil length.

3. (Previously presented) The gradient coil as set forth in claim 2, wherein:

the current sharing surface corresponds to a curved surface of a frustum of a cone with a cone angle defined by a difference between radii of the inner and outer cylindrical surfaces and a difference between the primary and shield coil lengths.

4. (Previously presented) The gradient coil as set forth in claim 1, wherein:

the shield coil is fingerprint patterned.

5. (Previously presented) A gradient coil comprising:

a primary coil defining an inner cylindrical surface;

a shield coil defining an outer cylindrical surface coaxially aligned with the inner cylindrical surface and having a larger cylindrical radius than the inner cylindrical surface; and

a plurality of coil jumps electrically connecting the primary and shield coils, the coil jumps defining a non-planar current-sharing surface extending between an inner contour coinciding with the inner cylindrical surface and an outer contour coinciding with the outer cylindrical surface, the primary coil, shield coil, and coil jumps cooperatively defining a current path that passes across the current-sharing surface between the inner and outer contours a plurality of times, wherein the primary coil includes communicating primary coil turns that electrically connect with a coil jump and isolated primary coil turns that do not electrically connect with a coil jump.

6. (Previously presented) The gradient coil as set forth in claim 5, wherein the shield coil includes:

communicating shield coil turns that electrically communicate with communicating primary coil turns via connecting coil jumps.

7. (Currently amended) ~~The~~ A gradient coil including:

a primary coil defining an inner cylindrical surface;

a shield coil defining an outer cylindrical surface coaxially aligned with the inner cylindrical surface and having a larger cylindrical radius than the inner cylindrical surface;

a plurality of coil jumps electrically connecting the primary and shield coils, the coil jumps defining a non-planar current-sharing surface extending between an inner contour coinciding with the inner cylindrical surface and an outer contour coinciding with the outer cylindrical surface, the primary coil, shield coil, and coil jumps cooperatively defining a current path that passes across the current-sharing surface between the inner and outer contours a plurality of times, the primary coil including communicating primary coil turns that electrically connect with a coil jump and isolated primary coil turns that do not electrically connect with a coil jump, ~~as set forth in claim 5,~~ wherein at least some of the isolated primary coil turns are

electrically interconnected to define an isolated primary sub-coil~~, and the gradient coil further includes:~~; and

a switch having at least:

a first state in which the isolated primary sub-coil is electrically connected with the communicating primary coil turns, and

a second state in which the isolated primary sub-coil is electrically isolated from the communicating primary coil turns;

the first and second states corresponding to first and second selectable fields of view.

8. (Previously presented) The gradient coil as set forth in claim **7**, wherein the isolated primary sub-coil is deenergized in the second state.

9. (Previously presented) The gradient coil as set forth in claim 7, wherein the isolated primary sub-coil is energized with opposite polarities in the two states.

10. (Previously presented) The gradient coil as set forth in claim **7**, wherein the gradient coil further includes:

a second shield coil that is energized in one of the two states to improve uniformity of the corresponding field of view.

11. (Previously presented) The gradient coil as set forth in claim **5**, wherein at least some isolated primary coil turns are interconnected to define a selectively electrically switched primary sub-coil, the gradient coil further including:

a second shield coil that is selectively energized in conjunction with switching of the primary sub-coil to define a variable field of view.

12. (Original) The gradient coil as set forth in claim **1**, further including:

a shielded correction coil that cooperatively adjusts a field of view over a continuous range.

13. (Currently amended) ~~The~~ A gradient coil ~~as set forth in claim 1, further including~~ for a magnetic resonance imaging apparatus, the gradient coil including:

a fingerprint-patterned primary coil defining an inner cylindrical surface;

a shield coil defining an outer cylindrical surface coaxially aligned with the inner cylindrical surface and having a larger cylindrical radius than the inner cylindrical surface;

a plurality of coil jumps electrically connecting the primary and shield coils, the coil jumps defining a non-planar current-sharing surface extending between an inner contour coinciding with the inner cylindrical surface and an outer contour coinciding with the outer cylindrical surface, the primary coil, shield coil, and coil jumps cooperatively defining a current path that passes across the current-sharing surface between the inner and outer contours a plurality of times; and

a generally cylindrical cold shield coaxially aligned with the outer cylindrical surface and having a larger cylindrical radius than the outer cylindrical surface, the cold shield carrying eddy current that produces a substantially spatially constant residual eddy current effect.

14. (Original) The gradient coil as set forth in claim **13**, wherein the substantially spatially constant residual eddy current effect is non-zero.

15. (Original) The gradient coil as set forth in claim **1**, wherein the gradient coil is a transverse gradient coil.

16. (Previously presented) The gradient coil as set forth in claim **1**, wherein the coil jumps are selected to minimize the stored energy of the coil.

17. (Original) A magnetic resonance scanner comprising:

a main magnet for generating a temporally constant magnetic field;

a gradient coil as set forth in claim **1** for inducing magnetic field gradients across the temporally constant magnetic field;

at least one RF coil disposed adjacent the gradient coil;

an RF transmitter connected with one of the RF coils for inducing and manipulating resonance;

an RF receiver connected with one of the RF coils for demodulating induced resonance; and

a reconstruction processor for reconstructing the demodulated resonance into an image representation.

18-20. (Canceled)

21. (Currently amended) The ~~method~~ gradient coil as set forth in ~~claim 19~~ claim **1**, wherein the primary coil, shield coil, and plurality of coil jumps are designed by a method ~~further~~ including:

computing current densities on the inner and outer cylindrical surfaces using constraints including minimizing stored energy and minimizing the variation of the residual eddy current effect, the current densities being generally non-zero at the inner and outer contours;

arranging coil turns of the primary and shield coils to approximate the computed current densities on the inner and outer cylindrical surfaces; and

during the arranging of coil turns, arranging the plurality of coil jumps to approximate the computed non-zero current densities at the inner and outer contours.

22. (Currently amended) The ~~method~~ gradient coil as set forth in claim **21**, ~~further including~~ wherein the design method further includes:

simultaneously with the computing of current densities on the inner and outer cylindrical surfaces, computing current densities on a current-sharing surface, the arranging of coil jumps being further constrained to approximate the computed current densities on the current-sharing surface.

23. (Currently amended) The ~~method~~ gradient coil as set forth in claim **21**, wherein the computing of current densities further includes:

constraining the current densities to produce a substantially spatially constant eddy current effect produced by a current density in a cold shield that surrounds the shield coil.

24-29. (Canceled)